

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1-4. (Canceled)

5. (currently amended) A method for plasma bonding of semiconductor substrates, the method comprising:

transferring a first substrate and a second substrate from a cassette to into a plasma chamber equipped with a bonding apparatus, the first substrate having a first face and the second substrate having a second face;

mechanically supporting the first substrate and the second substrate;

maintaining the first substrate and the second substrate in a predetermined environment in the plasma chamber;

exposing at least the first face or at least the second face to a plasma sustained in the plasma chamber; and

releasing the first substrate to initiate ~~initiating~~ a bond between the first face and the second face by contacting at least the first face with the second face, ~~using the bonding apparatus in the plasma chamber.~~

6. (Previously presented) The method of claim 5 wherein said plasma comprises hydrogen bearing species.

7. (Previously presented) The method of claim 5 wherein said plasma comprises an oxygen bearing species.

8. (Previously presented) The method of claim 5 wherein said plasma comprises an argon with hydrogen.

9. (Previously presented) The method of claim 5 wherein said plasma comprises an NH_4 bearing species.

10. (Previously presented) The method of claim 5 wherein the first face comprises an insulating material.

11. (Previously presented) The method of claim 5 wherein the second face comprises an insulating material.

12. (Previously presented) The method of claim 5 further comprising rinsing and drying the first substrate and the second substrate before the transferring of the first substrate and the second substrate into the plasma chamber.

13. (Previously presented) The method of claim 5 wherein the plasma reduces a surface species of at least the first face or at least the second face.

14. (Previously presented) The method of claim 5 wherein the predetermined environment is at least a vacuum.

15. (Currently amended) A method for in-situ plasma bonding of semiconductor substrates, comprising:

transferring a first substrate and a second substrate from a cassette to ~~into~~ a plasma chamber, the first substrate having a first face and the second substrate having a second face;

maintaining the first substrate and the second substrate in a predetermined environment in the plasma chamber;

exposing at least the first face or at least the second face to a plasma within the plasma chamber;

placing the first face in contact with the second face using a bonding apparatus to initialize a bond between the first face and the second face in the plasma chamber; and

removing the bonded first substrate and the second substrate from the plasma chamber.

16. (Previously presented) The method of claim 15 wherein said plasma comprises hydrogen bearing species.

17. (Previously presented) The method of claim 15 wherein said plasma comprises an oxygen bearing species.

18. (Previously presented) The method of claim 15 wherein said plasma comprises an argon with hydrogen.

19. (Previously presented) The method of claim 15 wherein said plasma comprises an NH₄ bearing species.

20. (Previously presented) The method of claim 15 wherein the first face comprises an insulating material.

21. (Previously presented) The method of claim 15 wherein the second face comprises an insulating material.

22. (Previously presented) The method of claim 15 further comprising rinsing and drying the first substrate and the second substrate before the placing step.

23. (Previously presented) The method of claim 15 wherein the plasma reduces a surface species of the first face and the second face.

24. (Currently amended) The method of claim ~~[[11]]~~15 wherein the predetermined environment is at least a vacuum.

25. (Currently amended) A method for in-situ plasma bonding of semiconductor substrates, comprising:

placing a first substrate and a second substrate into a plasma chamber, the first substrate having a first face and the second substrate having a second face;

mechanically supporting the first substrate and the second substrate;

maintaining the first substrate and the second substrate in a predetermined environment in the plasma chamber;
exposing at least the first face or at least the second face to a plasma; and
releasing the first substrate to allow placing the first face to be in contact with the
second face to initialize a bond between the first face and the second face in the plasma chamber.

26. (Previously Presented) The method of claim 25 wherein said plasma comprises hydrogen bearing species.

27. (Previously Presented) The method of claim 25 wherein said plasma comprises an oxygen bearing species.

28. (Previously Presented) The method of claim 25 wherein said plasma comprises an argon with hydrogen.

29. (Previously Presented) The method of claim 25 wherein said plasma comprises an NH₄ bearing species.

30. (Previously Presented) The method of claim 25 wherein the first face comprises an insulating material.

31. (Previously Presented) The method of claim 25 wherein the second face comprises an insulating material.

32. (Currently amended) The method of claim 25 further comprising rinsing and drying the first substrate and the second substrate before the placing step of the first substrate and the second substrate into a plasma chamber.

33. (Previously Presented) The method of claim 25 wherein the plasma reduces a surface species of the first face and the second face.

34. (Previously Presented) The method of claim 25 wherein the predetermined environment is at least a vacuum.

35. (Currently amended) Apparatus for in-situ bonding of substrates, the apparatus comprising:

a plasma chamber;

a cassette configured to hold substrates;

a bonding apparatus provided within the plasma bonding chamber; and

a plasma environment provided within the plasma chamber, the plasma environment being adapted to expose at least a first face of a first substrate or at least a second face of a second substrate to a plasma of the plasma environment;

whereupon the bonding apparatus causes at least the first face to initiate contact with the second face within the plasma chamber to initiate a bond between the first face of the first substrate and the second face of the second substrate.

36. (Previously Presented) Apparatus of claim 35 wherein the plasma reduces a surface species of at least the first face or the second face.

37. (Previously Presented) Apparatus of claim 35 wherein at least the first face or at least the second face comprises an oxide layer thereon.

38. (Previously Presented) Apparatus of claim 35 wherein said plasma is derived from hydrogen bearing species.

39. (Previously Presented) Apparatus of claim 35 wherein said plasma is derived from an oxygen bearing species.

40. (Previously Presented) Apparatus of claim 35 wherein said plasma is derived from an argon with hydrogen.

41. (Previously Presented) Apparatus of claim 35 wherein said plasma is derived from an NH₄ bearing species.